



Range extension of White-naped Jay, *Cyanocorax cyanopogon* (Wied-Neuwied, 1821) (Passeriformes, Corvidae), to southeastern Brazil

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Abstract. *Cyanocorax cyanopogon* (Wied-Neuwied, 1821), a bird endemic to Brazil, inhabits dry scrub and woodlands and the borders of tropical and riparian forests. Although *C. cyanopogon* is more common in central and northeastern Brazil, owing to increasing deforestation, its distribution has expanded to south. There are several records of this species outside its distribution as usually given. Here, we present the southernmost record of this species in Brazil, showing this species' expansion to the Southeastern Region. Therefore, this new record shows the importance of surveys to fill gaps in biodiversity knowledge, especially in disturbed environments.

Keywords. Atlantic Forest, anthropic disturbance, biodiversity hotspot, conservation, São Paulo

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Introduction

Cyanocorax cyanopogon (Wied-Neuwied, 1821), White-naped Jay, is a corvid species endemic to Brazil and distributed in the Northeast and East regions of the country. This jay inhabits mostly dense dry scrubland, mainly in the Caatinga and Cerrado ecoregions (Anjos 2009). *Cyanocorax cyanopogon* is gregarious, occurring in flocks of 3–10 individuals (Anjos 2020). These groups exhibit strong territorial behavior and are aggressive toward conspecific individuals belonging to alien flocks (Anjos 2009).

Members of the family Corvidae have high brain development and display innovative behaviors to overcome biological challenges (Emery and Clayton 2004). Their social organization demands cooperative strategies to share resources, as flock cohesion can be demised by intraspecific competition (Chiarati et al. 2010). For *C. cyanopogon* specifically, some researchers have observed a well-coordinated hierarchy during foraging, with mutual sharing and no observable competition within flocks (Barros et al. 2014).

Cyanocorax cyanopogon also exhibits high plasticity in exploiting resources. This species is omnivorous, feeding mainly on terrestrial arthropods and parts of plants, such as the pulp and seeds of fruits (Barros et al. 2014). The species is expanding its range to other states of southeastern Brazil, such as Espírito Santo and Rio de Janeiro (WikiAves 2022). Here, we present the southernmost record of *C. cyanopogon* in Brazil, which may show a possible range expansion of the species to the Southeast Region of the country. Our new data may also serve as basis for reviewing the geographical distribution of *C. cyanopogon* in the future.

Methods

The data were recorded in the municipality of Taquarivaí, near the Apiaí-Guaçu River, in the southwestern mesoregion of São Paulo state, southeastern Brazil (Fig. 1). Taquarivaí is in the transition between two ecoregions, the Cerrado and the Alto Paraná/Paranaíba Interior Forests (Instituto LIFE 2018). The region has a humid subtropical climate with hot and humid

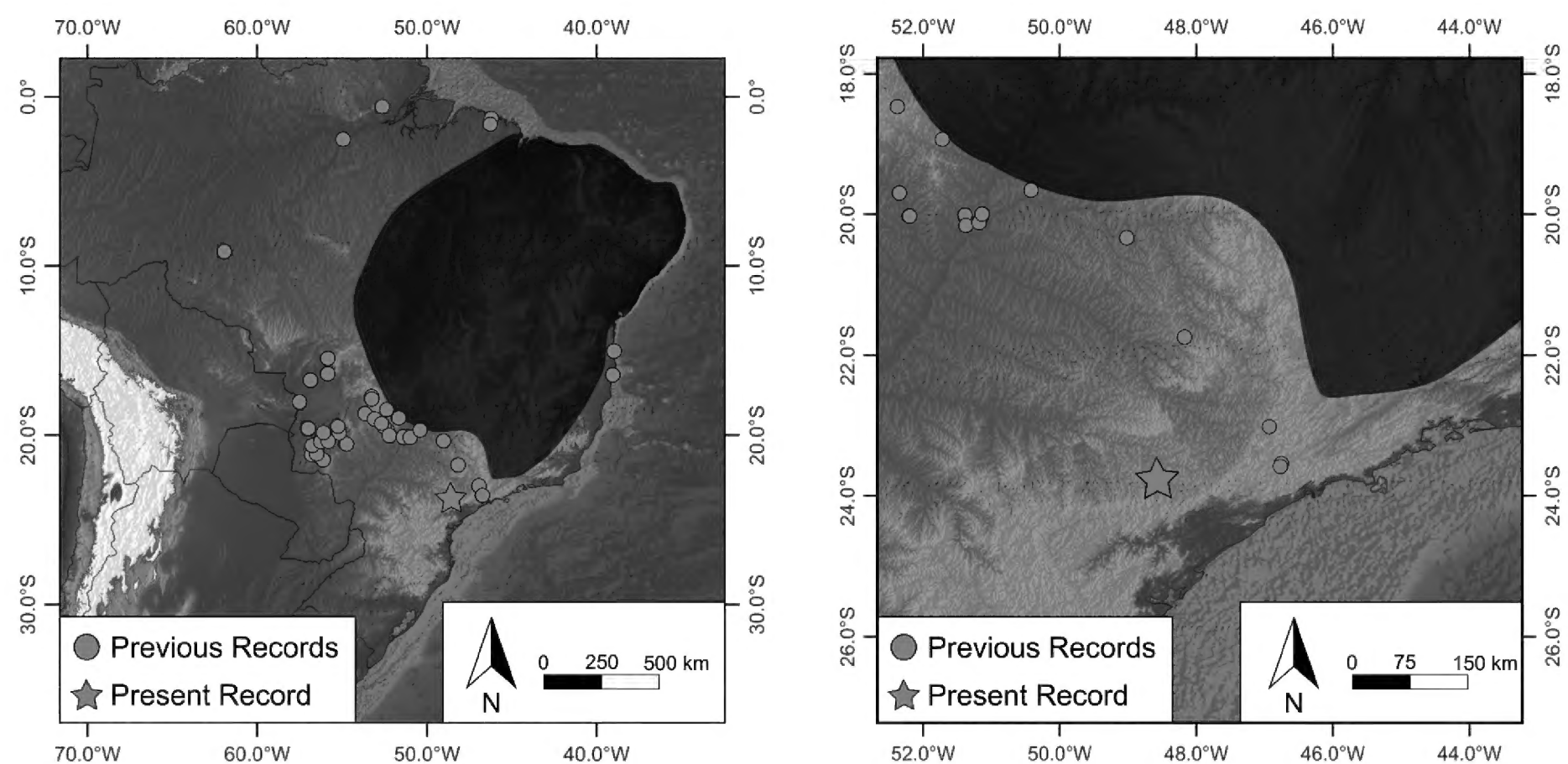


Figure 1. Occurrence of *Cyanocorax cyanopogon* in South America. The black area represents the range of the species as given by BirdLife International (2022); brown circles indicate the points of occurrence outside the proposed range; the red star indicates the new, southernmost record.

summers and mild winters and is classified as “Cfa” according to the Köppen climate classification (Rolim et al. 2007). Secondary forests in the area are almost exclusively restricted to small riparian fragments and surrounded by agricultural matrix, especially pastures and sugar-cane plantations.

We conducted opportunistic recordings. The lead author (GSC) carried out recreational birdwatching activities in the region on 6 February 2022 at 8:00 a.m., as he heard some spontaneous calls resembling the vocalization of corvids. He did a playback with calls of *C. cyanopogon* and was able to lure seven individuals. The birds were seen moving actively through the foliage of the riparian forest, and GSC was able to photograph only two individuals. After that, GSC recorded their calls using the internal microphone of a smartphone.

Subsequently, we conducted a survey to obtain other recordings of *C. cyanopogon* outside the geographic range as shown by BirdLife International (2022). We collected recordings from biological diversity databases, such as Xeno-Canto (2022), GBIF (2022), and eBird (2022). We did not include recordings and excluded data from WikiAves because this database does not provide geographic coordinates, which makes it difficult to compare the distance between previous records and ours. We plotted the data found against BirdLife International (2022) polygon showing of the distribution *C. cyanopogon* to find occurrences outside this species’ range.

Results

Cyanocorax cyanopogon (Wied-Neuwied, 1821)

Figures 2, 3

New records. BRAZIL – São Paulo • Taquarivaí, margins of the Apiaí-Guaçu River; 23°55'34.52"S, 048°

40'48.84"W; 610 m alt.; 06.II.2022; Guilherme Sementili-Cardoso obs.; seven adults; Xeno-Canto 727021.

A group of *C. cyanopogon* individuals was spontaneously vocalizing in the canopy of a riparian forest along the Apiaí-Guaçu River. The individuals actively moved across the vegetation and two of them emerged from the foliage, drawing the observer’s attention to the flock of seven individuals. The flock remained in the vicinity for approximately 5 min. Only two individuals were able to be photographed (Fig. 2). The flock then moved out of sight, crossed the river, and perched on trees on the opposite bank of the river.

Identification. We identified individuals of *C. cyanopogon* by several diagnostic features: broad white area on the hindneck, white becoming dull brown on the remaining upper parts, which gives this species its English name; head, sides of neck, throat, and chest black; spot above eye bright silvery blue, with a spot below eye; mustache short, deep blue; tail broadly tipped and white; and lower underparts white (Figure 3A–D). Moreover, we identified their vocalization, which consists of a series of harmonic calls with melodic and metallic tones (Xeno-Canto 727021), resembling the sound of “kaw-kaw”, which gives the Portuguese name to the species (gralha-cancã).

Three other congeneric species occur in the same area. *Cyanocorax chrysops* (Vieillot, 1818), Plush-crested Jay, is similar to *C. cyanopogon*, but it has stiff crests, bluish bands on the hindneck, and an ultramarine to blue spot above the eyes (Ridgely and Tudor 1997). *Cyanocorax cristatellus* (Temminck, 1823), Curl-crested Jay, has a conspicuous crest on the head, a fuliginous black neck, and no spots around the eye. Finally, *Cyanocorax caeruleus* (Vieillot, 1818), Azure Jay, has caerulean blue upper and underparts, a dark, black nape, and no spots



Figure 2. *Cyanocorax cyanopogon* individuals photographed in Taquarivaí municipality, São Paulo, Brazil.

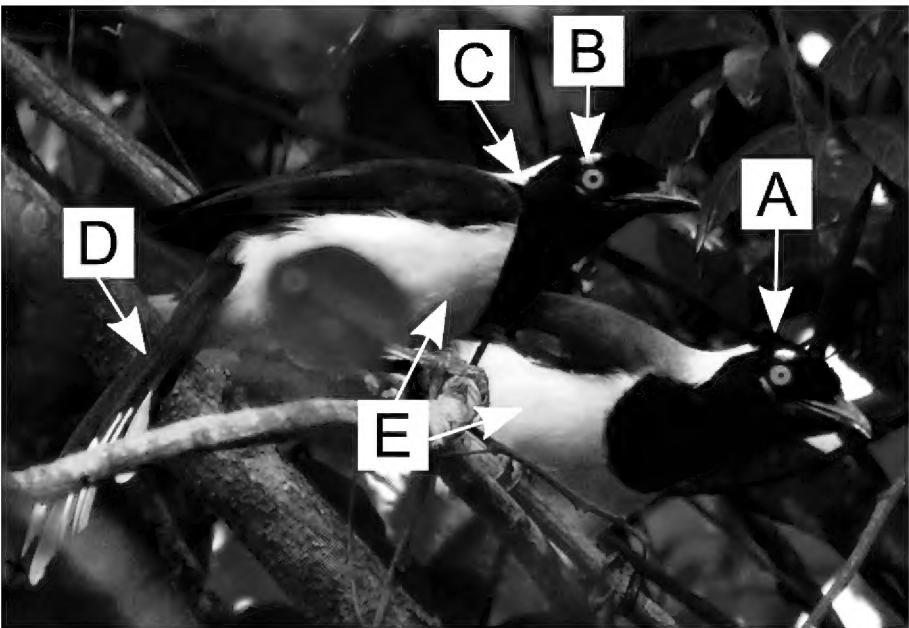


Figure 3. Diagnostic features for the identification of *Cyanocorax cyanopogon*: A = small crest; B = small, pale blue spots above and below eye; C = white nape; D = dull dark brown rectrices with pale white tips; E = creamy white underparts.

around the eyes. These species can be distinguished to *C. cyanopogon* based on several morphological features (Table 1).

Discussion

Here, we present a new record of *Cyanocorax cyanopogon* in southeastern Brazil, which is the southernmost for

this species and approximately 188 km from the previous known southernmost one. Other individuals have been recorded outside the range, as given by BirdLife International (2022) and in Appendix, Table A1, which implies that the species is currently dispersing to new areas. The geographic range of this species is expanding to areas that were previously covered by humid forests (WikiAves 2022), such in the states of Espírito Santo and Rio de Janeiro. The oldest record of *C. cyanopogon* outside its historcal range is from 2007 (eBird catalogue no. 1001958505). As *C. cyanopogon* inhabits drylands in open physiognomies (Anjos 2009), and we argue it may be dispersing into deforested areas of southern and southeastern Brazil and consequently expanding its range.

The expanding ranges of other bird species following anthropogenic disturbances has already been described. Straube et al. (2007) reported the geographic expansion of *Fluvicola nengeta* (Linnaeus, 1766) to southern regions of Brazil, arguing that is linked to extensive landscape modification for agriculture. *Rhynchotus rufescens* (Temminck, 1815) is another species that benefits from forest suppression. As the species inhabits open grasslands, the destruction of tropical forests for pasture has helped it expand to previously forested areas (Cabot 2020). On the other hand, the suppression

Table 1. Diagnostic features of the four sympatric species of *Cyanocorax* in the study area.

Diagnostic feature	<i>C. cyanopogon</i>	<i>C. chrysops</i>	<i>C. cristatellus</i>	<i>C. caeruleus</i>
Iris color	Golden yellow	Golden yellow	Black	Black
Crest	Small, on rear of head	Bushier, on rear crown	Conspicuous, curled, on front of head	Small, near base of beak
Nape color	White	Pale yellow grading to pale blue	Fuliginous black	Dark, black
Colored spots around eye	Small, pale blue spots above and below eye	Conspicuous, ultramarine blue spot above eye	Absent	Absent
Upperwing color	Dull, dark brown	Metallic, dark blue	Bluish violet	Caerulean blue
Color of the underparts	Creamy white	Creamy yellow	White	Caerulean blue
Color of superior surface of rectrices	Dull, dark brown, with pale white tips	Dark violet-blue, with broad, pale yellow or pale white tips	Violet blue with white tips	Caerulean blue

of natural grasslands and woodlots may also change its original occurrence (BirdLife International 2023), pressuring the species to move to new areas.

Habitat preference can also influence the range expansion of *C. cyanopogon*. Anjos and Shibatta (2010) analyzed habitat occupancy based on the morphometric features of some neotropical jays in South America and concluded that they belong to two distinct groups. The first group is composed of species with longer wings, which enables them to fly over larger distances, and the second consists of taxa with shorter wings, which favors short flights through dense scrublands. *Cyanocorax cyanopogon* belongs to this second group, inhabiting dense scrublands and making short flights to cross the understory (Anjos 2009; BirdLife International 2022). The morphometric features of *C. cyanopogon* influence the habitat occupancy which, in turn, may explain the range expansion of the species in areas where continuous forests were and shrublands are scattered through the landscape. In this area, secondary riparian forests with dense understory, locally known as capoeiras (SIFESP 2009), are commonly associated with decidual forest fragments that have suffered recent selective logging (Silva and Vibrans 2019).

Several factors, such as flock hierarchy, social cohesion, and feeding preference, could be favoring the dispersal of *C. cyanopogon* to disturbed areas. The social organization of a species and its associated hierarchical structure have a strong influence on flock survival (Clayton and Emery 2007). *Cyanocorax cyanopogon* are able to explore anthropic environments while foraging. Since diet specialists are more sensitive than omnivores to variation in resource availability on altered environments (Bowler et al. 2019), species with feeding plasticity are less sensitive to environmental alteration. Barros et al. (2014) concluded that *C. cyanopogon* has high plasticity when exploring food resources, and its generalist foraging behavior could favor its expansion into anthropogenic environments. Other social behaviors displayed by congeneric species, such as communal breeding and nest defense, could also explain the success of *C. cyanopogon* in anthropogenic environments (Bosque and Molina 2002). This plasticity could help *C. cyanopogon* explore new environments which, consequently, could lead to an increase in its distribution.

Although the expansion of some species to new areas is not novel, our results show the importance of new surveys to fill gaps in biodiversity knowledge, especially in disturbed environments. Range expansion due to interference competition, where a strong competitor excludes local avian populations in disturbed habitats, has been observed in some bird species (Amarasekare 2002). The response to these disturbances can differ even among congeneric taxa, as some jay species, such as *C. cristatellus*, can benefit from predicted climate changes (Marini et al. 2009). Our new record is important because it is additional evidence on the changes in the composition and integrity of bird assemblages in response to anthropogenic disturbance.

We recommend additional studies on the population dynamics of *C. cyanopogon*, especially in southeastern Brazil, to better comprehend the effects of range expansion and changes in community composition in tropical forests.

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Appendix

Table A1. Occurrences of *Cyanocorax cyanopogon* outside the polygon representing the distribution of the species as given by Birdlife International (2022).

Source	Catalogue no.	Latitude	Longitude	Date
New record	727021	−23.7946	−048.5849	16.II.2022
Xeno-Canto	98505	−09.1720	−061.9450	05.IV.2012
GBIF	921355424	−20.5524	−056.6410	14.VIII.2013
GBIF	1848368359	−21.7429	−048.1734	01.I.2013
GBIF	2634530463	−23.5436	−046.7614	19.VIII.2018
GBIF	2596378708	−23.5437	−046.7614	26.VIII.2018
GBIF	3302010323	−23.5437	−046.7613	30.III.2018
GBIF	3302159044	−23.5438	−046.7612	20.V.2018
GBIF	2883007825	−23.5440	−046.7610	03.X.2020
GBIF	3070625682	−23.5456	−046.7608	08.I.2020
GBIF	3457140654	−23.5493	−046.7578	01.VIII.2020
GBIF	3355389091	−23.5427	−046.7606	05.IX.2021
GBIF	3455839621	−23.5431	−046.7605	16.I.2022
GBIF	3466248240	−23.5433	−046.7606	25.I.2022
GBIF	3455746425	−23.5438	−046.7607	16.I.2022
eBird	1001958505	−20.1979	−056.1976	30.XII.2007
eBird	1013954777	−19.5557	−057.0386	17.X.2009
eBird	1013823553	−20.4085	−056.3423	15.X.2009
eBird	813999087	−21.1264	−056.4850	08.IV.2012
eBird	813991583	−21.1326	−056.6233	10.IV.2012
eBird	814677545	−21.1715	−056.4459	06.V.2012
eBird	1184264688	−20.4952	−054.7978	12.II.2013
eBird	380041797	−01.3009	−046.2248	09.V.2014
eBird	285131120	−01.6002	−046.2972	09.XII.2014
eBird	1279068832	−15.0128	−039.0021	10.VII.2014
eBird	528224734	−16.3460	−055.8630	22.VII.2014
eBird	272781580	−19.6518	−050.4195	04.VII.2014

Source	Catalogue no.	Latitude	Longitude	Date
eBird	294444165	-16.4361	-039.0674	29.I.2015
eBird	343456071	-18.7077	-053.6486	12.IX.2015
eBird	347253591	-19.7593	-055.2181	10.X.2015
eBird	1029532715	-15.4440	-055.8247	29.III.2016
eBird	454253515	-18.9339	-051.7125	02.VII.2016
eBird	480058007	-00.5808	-052.6583	21.III.2017
eBird	532336732	-19.6426	-057.0306	09.IX.2017
eBird	513953847	-20.0956	-055.9648	25.VI.2017
eBird	532331205	-20.3090	-055.8460	07.IX.2017
eBird	790762845	-16.7481	-056.8575	01.VIII.2019
eBird	792416615	-16.7483	-056.8577	01.VIII.2019
eBird	816379781	-17.7190	-053.2702	28.VIII.2019
eBird	753160592	-17.7232	-053.2838	01.III.2019
eBird	816380235	-17.7313	-053.2796	30.VIII.2019
eBird	828525398	-18.4652	-052.3766	15.XI.2019
eBird	852695247	-21.4484	-056.1502	03.III.2019
eBird	738575596	-23.5416	-046.7540	14.IV.2019
eBird	714940403	-23.5437	-046.7612	24.II.2019
eBird	943439525	-02.5077	-054.9527	15.VI.2020
eBird	879292614	-17.8273	-053.2840	10.III.2020
eBird	993948396	-18.0387	-057.4912	07.X.2020
eBird	952345603	-19.0571	-053.0182	05.VII.2020
eBird	954496493	-19.2621	-052.6831	07.VII.2020
eBird	956516151	-19.6983	-052.3469	12.VII.2020
eBird	957265139	-20.0238	-052.2036	13.VII.2020
eBird	957659603	-23.5442	-046.7606	18.VII.2020
eBird	961081284	-23.5444	-046.7612	24.VII.2020
eBird	962589457	-23.5611	-046.7584	31.VII.2020
eBird	1079100034	-20.0701	-051.3753	20.II.2021
eBird	1106048655	-20.0749	-051.1607	28.III.2021
eBird	1203038256	-20.1133	-051.1774	18.VII.2021
eBird	1301377211	-20.1509	-051.3656	23.XII.2021
eBird	1082690161	-20.3306	-049.0167	25.II.2021
eBird	1232394787	-21.1380	-056.4492	05.IX.2021
eBird	1149450054	-23.0152	-046.9366	09.V.2021